Surface water monitoring at 30 m resolution; prototyping new Copernicus Global Land Service products

J.-F. Pekel, A. Cottam, M. Clerici, A. Belward, G. Dubois, E. Bartholome (EC JRC)
and N.Gorelick (GEE)

Landsat 8

graphic courtesy USGS

Sentinel 2

graphic courtesy ESA

European Commission

Copernicus
The European Earth Observation Programme

Global Land Service

search this site

Home | Products | FAQ | Helpdesk | Links | News & events | About the global land service | Copernicus | Land service

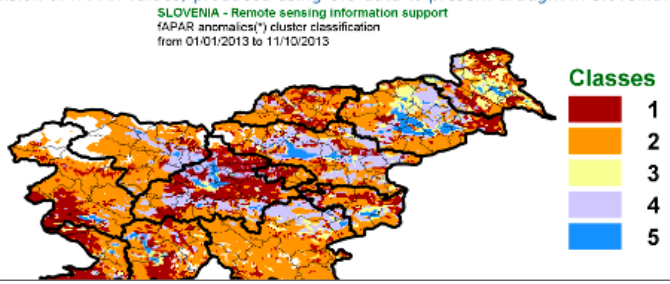
Home

The Global Land Component in the framework of GMES Initial Operations (GIO) is earmarked as a component of the Land service to operate "a multi-purpose service component" that will provide a series bio-geophysical products on the status and evolution of land surface at global scale. Production and delivery of the parameters are to take place in a timely manner and are complemented by the constitution of long term time series.

Read more

Special images

Space and Time Syntheses (April - September 2013, combine start/duration/intensity/ extension of FAPAR values) produced using GIO data to present draught in Slovenia.



Go to product:

- Choose Product -
Burnt Area (BA)
Dry Matter Productivity (DMP)
Fraction of Absorbed Photosynthetically Active Radiation (FAPAR)
Fraction of green Vegetation Cover (FCover)
Leaf Area Index (LAI)
Normalized Difference Vegetation Index (NDVI)
Vegetation Condition Index (VCI)
Vegetation Productivity Index (VPI)
Land Surface Temperature (LST)
Surface Albedo (SA)
Top Of Canopy Reflectances (TOC-r)
Soil Water Index (SWI)
Water Bodies (WB)

Read more

World Water Day 2014 and the importance of Water Bodies products!

News published:
1 month 1 week ago

Joint Research Centre

1. **Human wellbeing and economy** – water supply
2. **Human security** - flood and drought monitoring
3. **Essential Climate Variables** – lake area, river discharge (modeling, impacts, adaptation)
4. **Food security** – irrigation, rangeland management
5. **Human and animal health** – pollution, poisons, disease and vectors
6. **Biodiversity** – wetland, lacustrine and riverine ecosystems, invasive species and migratory corridors
7. **Coastline, lake, river boundary changes –** infrastructure planning, insurance, reference databases

1. **Permanent water surfaces**
2. **Seasonal water surfaces (and dates)**
3. **Ephemeral water surfaces (and dates)**
4. **New water surfaces**
5. ***Never water surfaces***

Lake Maggiore, Italy 2009

Katse Dam, Lesotho 2005

Badwater Death Valley, USA 2005

Okavango delta, Botswana 2006

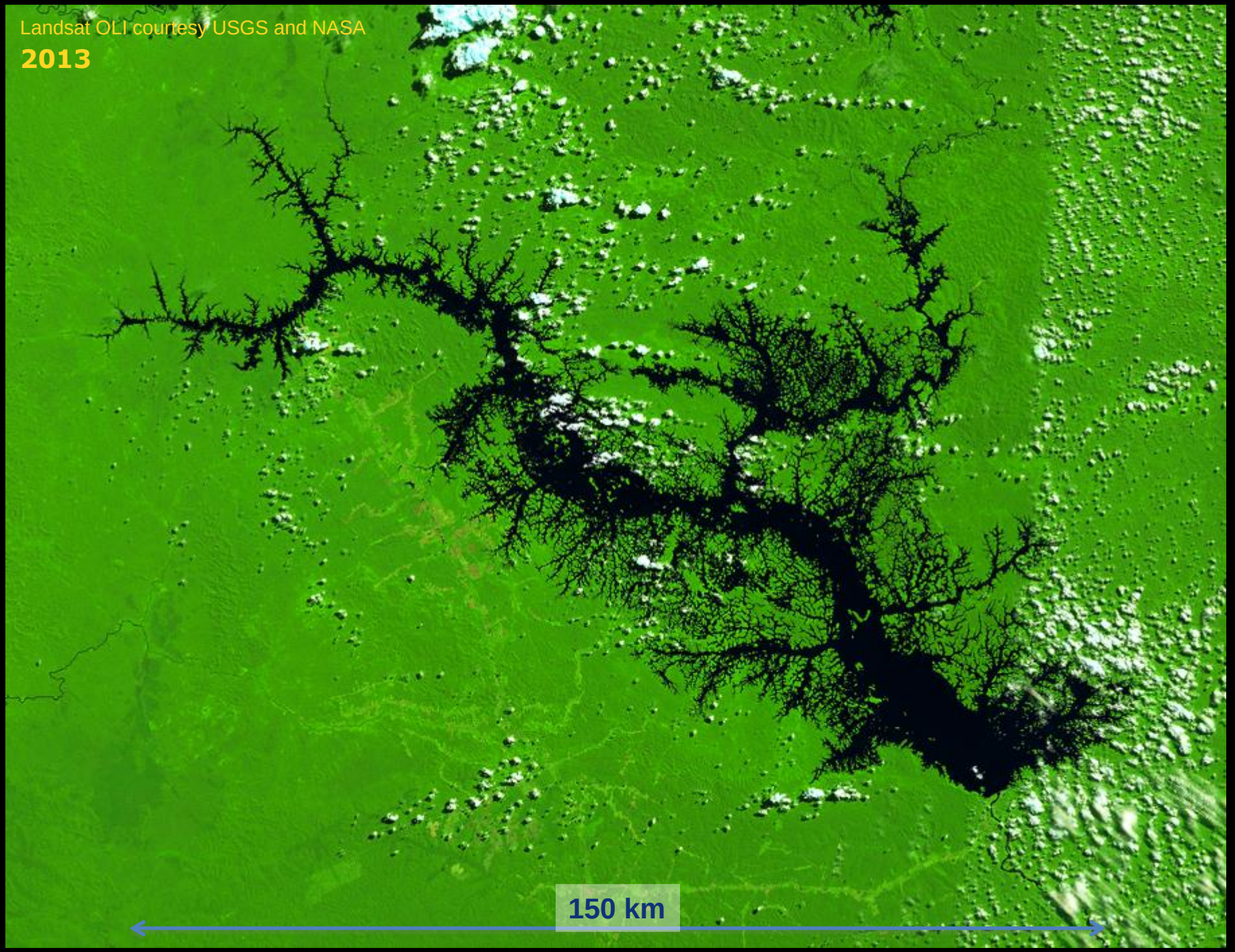
Joint Research Centre

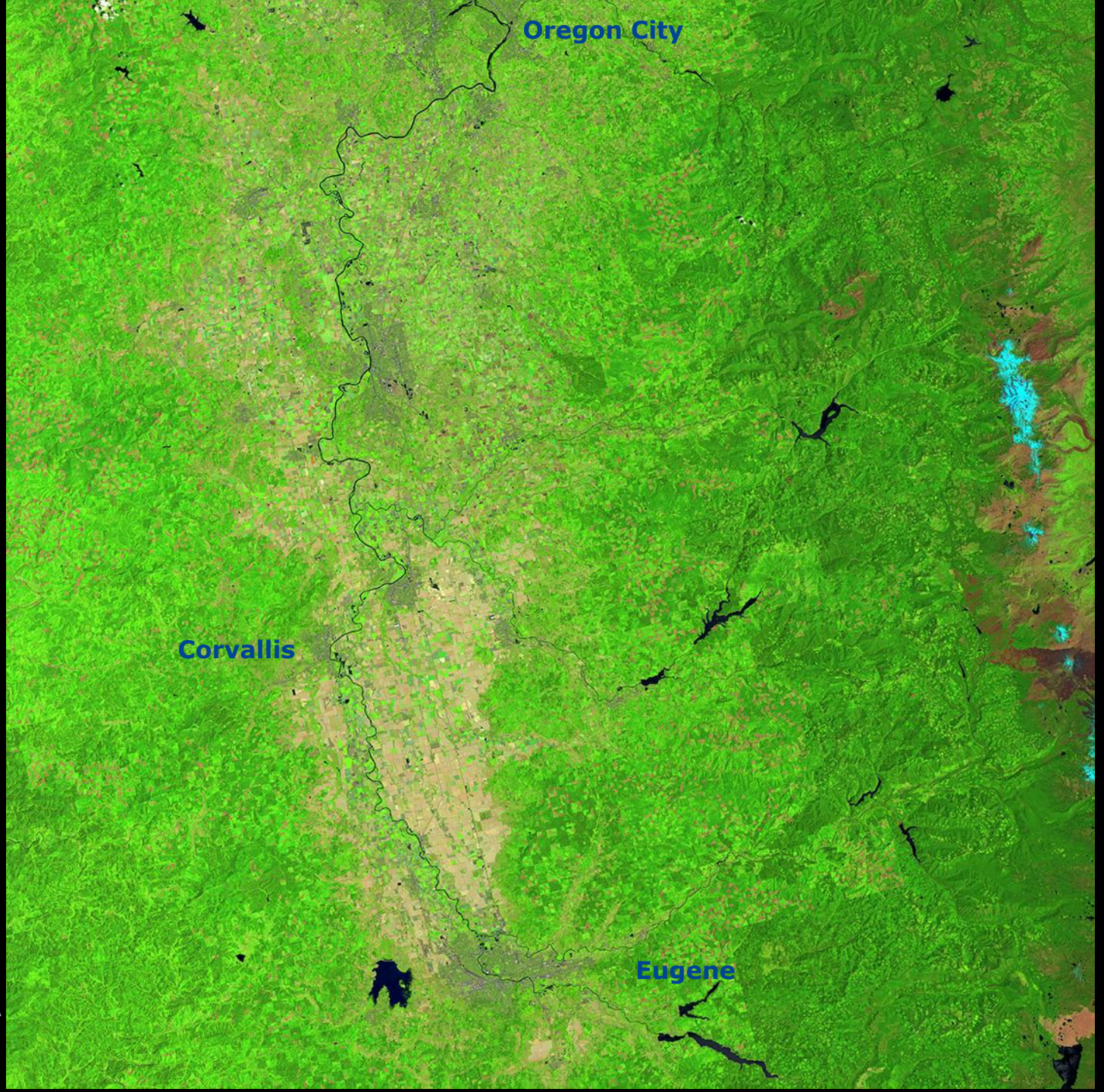
Landsat MSS courtesy USGS and NASA

1972

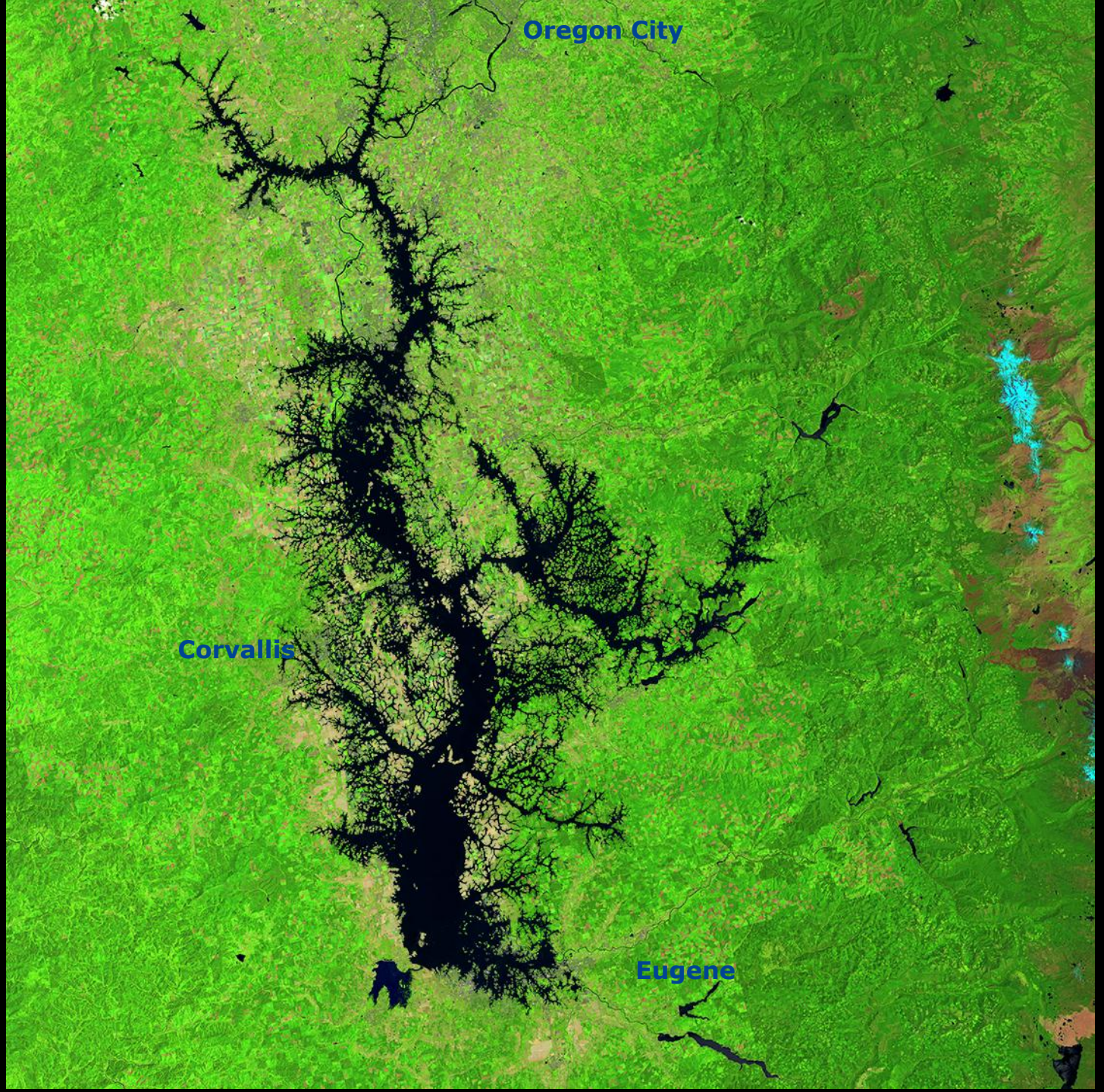
150 km

Landsat TM courtesy USGS and NASA
1987
150 km


Landsat OLI courtesy USGS and NASA
2013
150 km



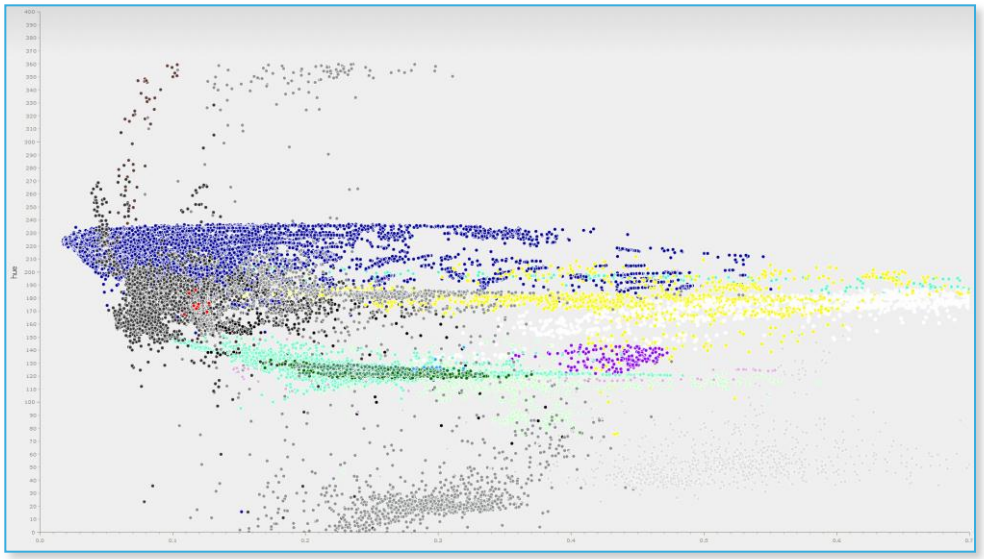
Corvallis
Landsat 6th July 2014
Courtesy USGS / NASA


Oregon City
Corvallis
Eugene

Surface water detection method

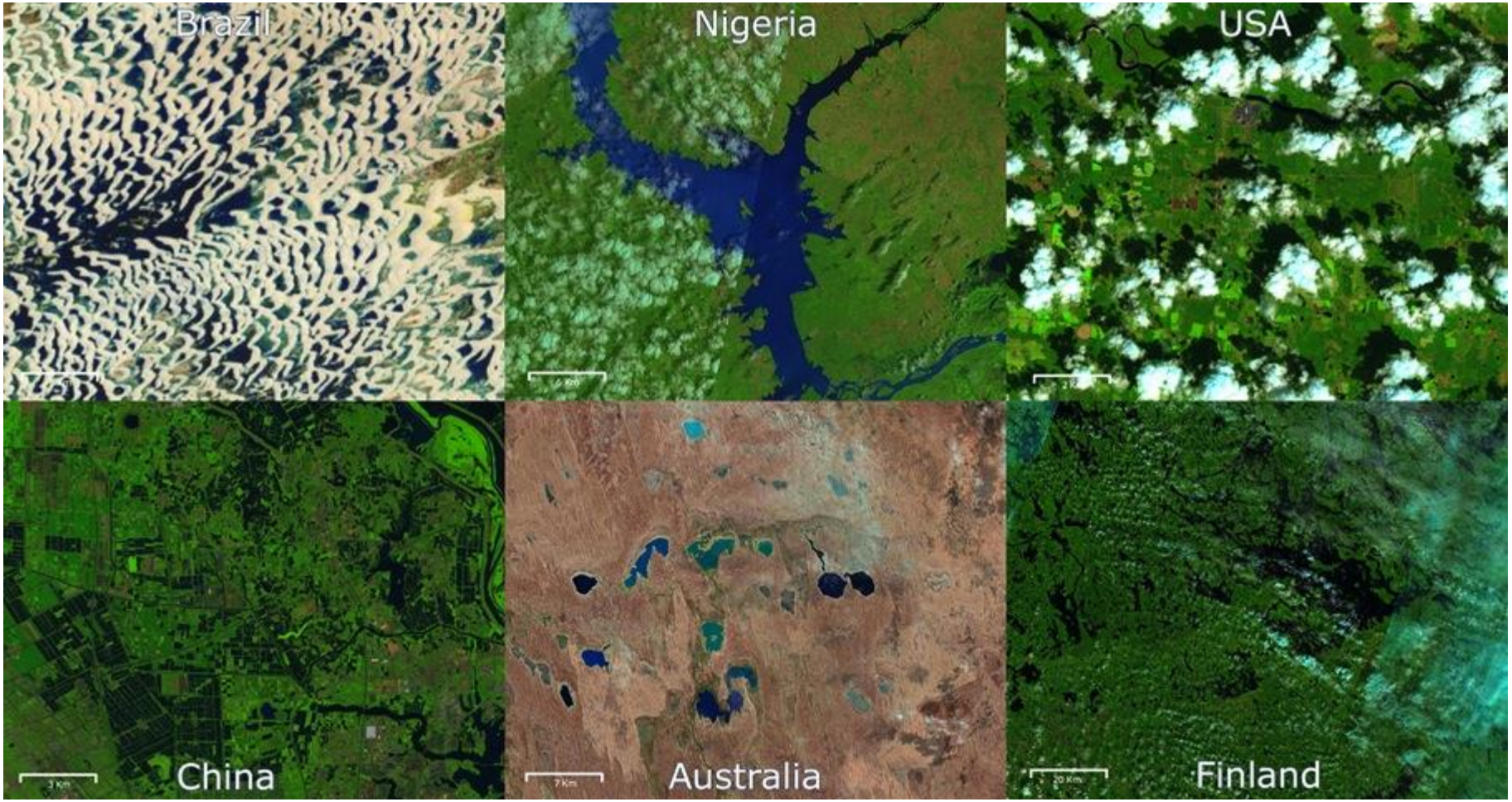
1. **Based on Hue/Saturation/Value colour model –** rather than RGB
2. **Sensor neutral** – used on L5, L7, L8 and MODIS
3. **Uses Google Earth Engine for processing**
4. **Uses tools built on top of GEE -** for spectral library development, classification and validation
5. **Uses a number of masks:**

Cloud
Snow
Vegetation
Slope
Bare rock
Temperature masks



HV 7, 5, 4

Surface water examples

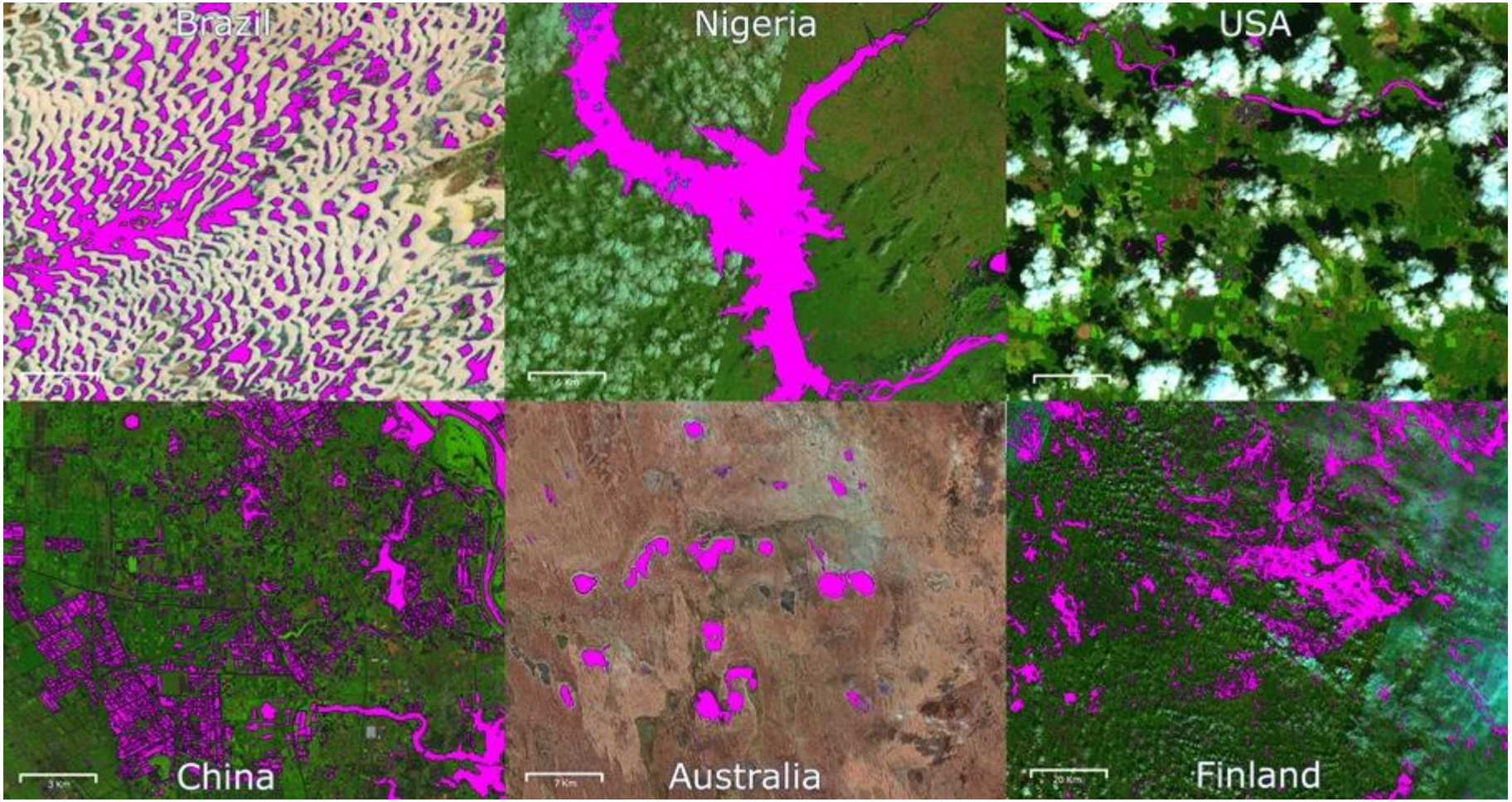


Landsat imagery (courtesy USGS / NASA) extracted from Google Earth Engine

Joint Research Centre

Source; Andrew Cottam, J-F Pekel (JRC) Noel Gorelick (GEE)

Surface water detected

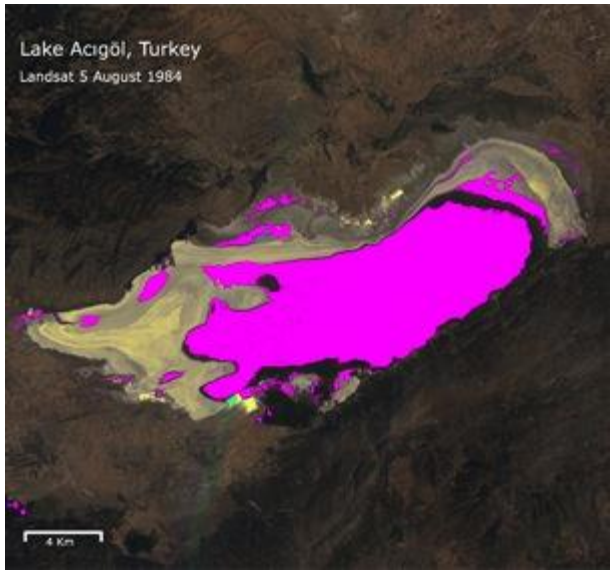


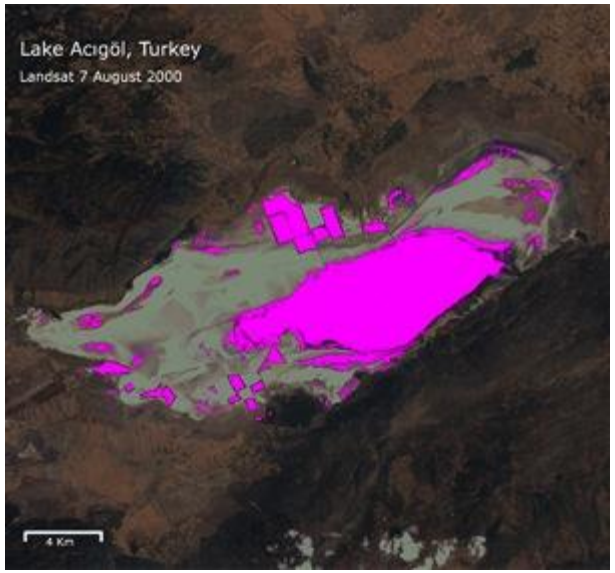
Landsat imagery (courtesy USGS / NASA) extracted from Google Earth Engine

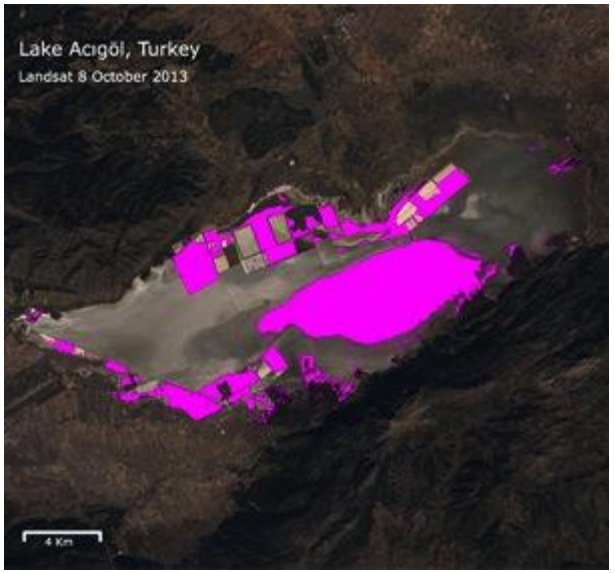
Joint Research Centre

Source; Andrew Cottam, J-F Pekel (JRC) Noel Gorelick (GEE)

Inter Annual variation



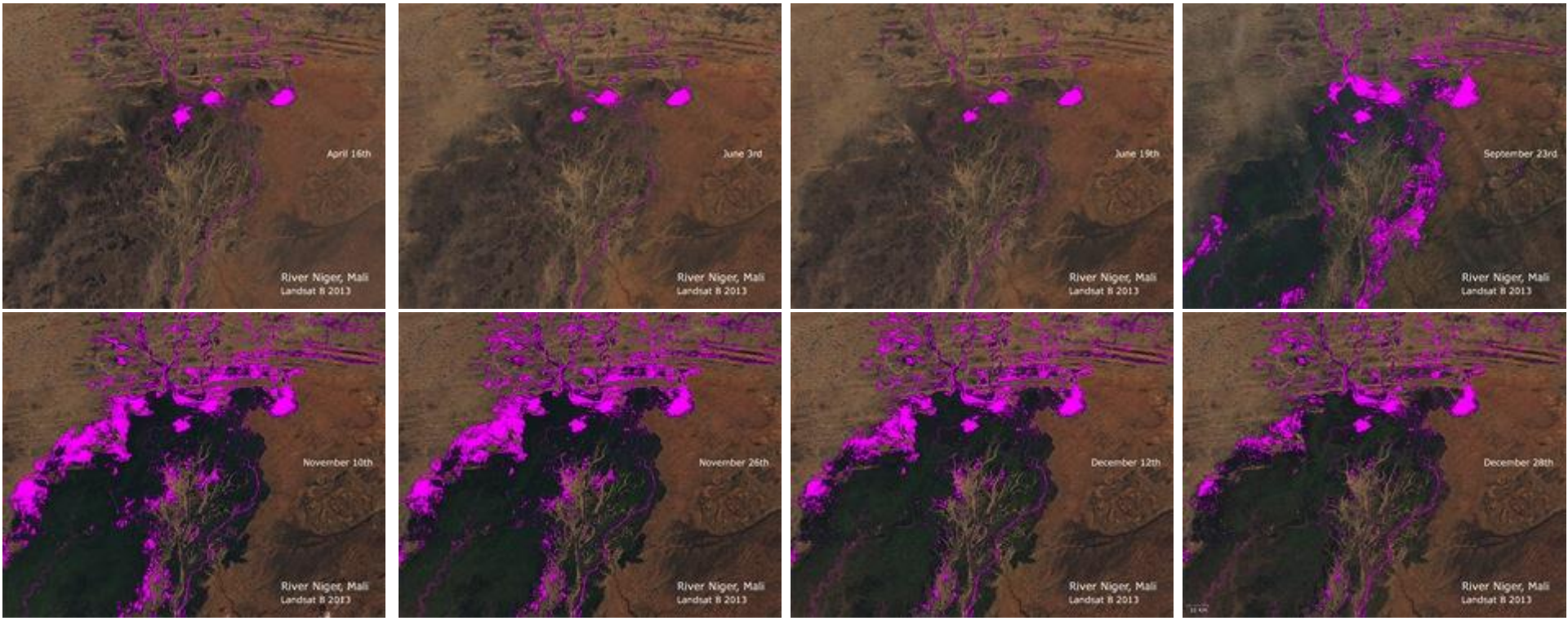




Landsat imagery (courtesy USGS / NASA) extracted from Google Earth Engine

Source; Andrew Cottam, J-F Pekel (JRC) Noel Gorelick (GEE)

Intra Annual variation



Landsat imagery (courtesy USGS / NASA) extracted from Google Earth Engine

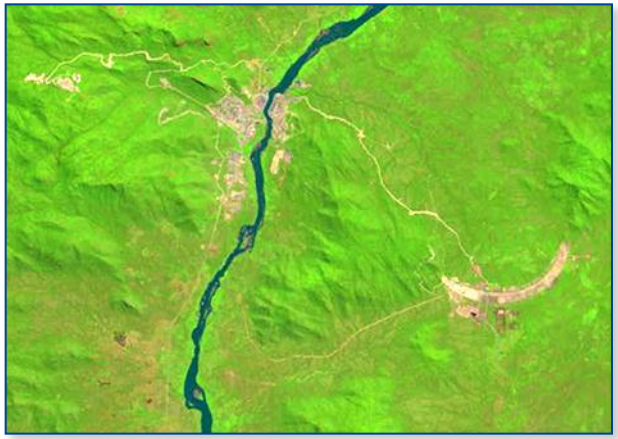
Joint Research Centre

Source; Andrew Cottam, J-F Pekel (JRC) Noel Gorelick (GEE)

1. Global land surface process monitoring at Landsat-class resolution is a reality, but we are working at the limits of the system...
2. high quality radiometry and calibration are needed; which also allows multi-platform/sensor analysis...
3. which leads to better inter and intra annual temporal sampling...
4. and thus **completely new products** and services that meet the needs of *many* end-users

Grand Renaissance Dam
Blue Nile, Ethiopia
15 October 2000

Grand Renaissance Dam
Blue Nile, Ethiopia
4 October 2011



Grand Renaissance Dam
Blue Nile, Ethiopia
19 October 2013